July 29, 2005

BY ELECTRONIC FILING

Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: *Use of Portions of Returned 2 GHz Mobile Satellite Service Frequencies, IB Docket No. 05-221*

Dear Ms. Dortch:

On July 25, 2005, Intel Corporation ("Intel") submitted Reply Comments (attached) in response to the Public Notice released by the Federal Communications Commission ("Commission") in IB Docket No. 05-220. *See Commission Invites Comments Concerning Use of Portions of Returned 2 GHz Mobile Satellite Service Frequencies,* Public Notice, FCC 05-133, IB Docket No. 05-220 (rel. June 29, 2005). In those Reply Comments, Intel urged that the Commission maintain its commitment to market-based spectrum management principles and adopt policies in the 2 GHz band that promote the highest and best use of this spectrum and maximize consumer welfare. In particular, Intel recommended that the Commission allocate the full 24 MHz of returned 2 GHz spectrum to fixed and mobile terrestrial wireless operations and designate the spectrum for advanced wireless services.

Intel now hereby incorporates its July 25, 2005 Reply Comments into the above captioned proceeding, in which the FCC issued a Public Notice requesting comment on various options for redistributing approximately one-third of the 2 GHz band. *See Commission Invites Comments Concerning Use of Portions of Returned 2 GHz Mobile Satellite Service Frequencies,* Public Notice, FCC 05-134, IB Docket No. 05-221 (rel. June 29, 2005). Pursuant to the Commission's rules, this letter and the attached Reply Comments are being filed electronically in the record of this proceeding.

Should you have any questions, please do not hesitate to contact me.

Sincerely,

/s/ Peter K. Pitsch

Peter K. Pitsch
Communications Policy Director
Intel Corporation
1634 I Street NW, Suite #300
Washington, DC 20006

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Use of Portions of Returned 2 GHz Mobile Satellite Service Frequencies	)	IB Docket No. 05-220

REPLY COMMENTS OF INTEL CORPORATION

July 25, 2005

Summary

The Commission has issued two separate public notices regarding how it should allocate and assign 24 MHz of spectrum in the 2 GHz band that has been surrendered by Mobile Satellite Service ("MSS") licensees. The first public notice seeks comment on assigning 11 MHz of this returned spectrum to the two remaining 2 GHz MSS licensees, while the second public notice seeks comment on allocating the other 13 MHz of returned spectrum, including the option of allocating it for terrestrial fixed and mobile services. The comments filed in response to the first public notice, while advancing various positions, demonstrate that the issues raised by the two public notices are highly interrelated. Intel Corporation ("Intel") consequently recommends that the Commission consolidate its consideration of these issues and ensure that all 24 MHz of the returned spectrum is put to its most efficient, highly valued use.

The best means for achieving this public interest goal would be to permit fully flexible use of the returned spectrum and conduct an auction to let the marketplace determine what services are offered on these frequencies. The Commission, however, is faced with statutory restrictions in auctioning spectrum used for the provision of international satellite services. It thus should pursue a "next-best" approach in redistributing the 24 MHz of returned 2 GHz spectrum based on marketplace principles.

In doing so, the Commission should consider several key factors. First, allocating all 24 MHz of the returned spectrum for terrestrial use will provide greater benefits than allocating only 13 MHz for terrestrial use. A wireless carrier deploying terrestrial service on a 24 MHz allocation would have to deploy only one-third as many additional cell sites to meet increased network traffic demands than if it were deploying a system on a 13

MHz allocation. This would translate into substantial cost savings and make a full 24 MHz terrestrial allocation significantly more valuable than a 13 MHz allocation.

Second, the available data indicates that the marketplace would place a significantly higher value on the unassigned 2 GHz spectrum under a terrestrial wireless allocation than under the existing MSS allocation. Based on Commission spectrum valuations of 1.9 GHz spectrum in recent proceedings and secondary market transactions, an auction of the 24 MHz of spectrum for terrestrial services would likely yield over nine billion dollars in bids. This high valuation reflects the exploding consumer demand for terrestrial wireless services, and contrasts sharply with the MSS industry's struggle for financial viability.

Third, assigning any of the 24 MHz of spectrum to MSS licensees is not necessary to promote competition. Even if the Commission maintains just two MSS licensees in the 2 GHz band, those licensees will not enjoy market power in the provision of mobile voice services or broadband wireless services. These licensees would continue to face strong competition from MSS licensees in other bands, as well as from terrestrial wireless and wireline carriers.

Taking into account the above factors, the Commission should allocate all 24 MHz of the returned 2 GHz spectrum for flexible, fixed and mobile terrestrial use. Allocating the 24 MHz of returned spectrum for terrestrial use is the optimal outcome in terms of promoting spectrum efficiency and maximizing consumer welfare.

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REPLY COMMENTS OF INTEL CORPORATION

Intel Corporation ("Intel") hereby submits the following reply comments in response to the public notice released by the Federal Communications Commission ("Commission") in the above-referenced proceeding.[1] Intel is the world's largest semiconductor manufacturer and a leader in technical innovation. Intel is also a leading manufacturer of communications and networking chips and equipment. In this proceeding, Intel urges that the Commission maintain its commitment to market-based spectrum management principles and adopt policies in the 2 GHz band that promote the highest and best use of this spectrum and maximize consumer welfare.

I. INTRODUCTION

Intel commends the FCC for expeditiously addressing issues relating to the redistribution of 24 MHz of spectrum recently surrendered by three Mobile Satellite Service ("MSS") licensees in the 2000-2020/2180-2200 MHz band ("2 GHz band"). In

[1] *Commission Invites Comments Concerning Use of Portions of Returned 2 GHz Mobile Satellite Service Frequencies,* Public Notice, FCC 05-133, IB Docket No. 05-220 (rel. June 29, 2005) ("*First 2 GHz MSS Public Notice*").

the *First 2 GHz MSS Public Notice*, the Commission proposes to reassign 11 MHz of this returned spectrum to the two remaining MSS licensees at 2 GHz – ICO Satellite Services ("ICO") and TMI Communications and Company Limited Partnership ("TMI") – such that each would have one-third (or 13.3 megahertz) of the spectrum in the 2 GHz band.[2] In a second, concurrently released public notice, the Commission invites comment on three options for redistributing the remaining one-third (13.3 megahertz) of the 2 GHz band.[3] The Commission asks commenters to address whether the remaining 13.3 MHz should be (i) divided between ICO and TMI, as these licensees have proposed; (ii) made available to other MSS applicants in a new processing round; or (iii) reallocated in whole or in part to another service.[4] According to the Commission, the third option would require a new rulemaking proceeding.[5]

Comments filed in response to the *First 2 GHz MSS Public Notice* advocate the full range of possibilities regarding the assignment and allocation of the returned 2 GHz spectrum. ICO agrees with the Commission's proposal to reassign at least a portion of the unassigned 2 GHz spectrum to itself and TMI. CTIA – The Wireless Association ("CTIA") and T-Mobile USA, Inc. ("T-Mobile"), on the other hand, argue that the full 24 MHz should be reallocated to terrestrial wireless operations.[6] Inmarsat Ventures Limited ("Inmarsat") argues that the Commission should consider licensing this spectrum to other

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[2] *First 2 GHz MSS Public Notice* at 1.

[3] *Commission Invites Comments Concerning Use of Portions of Returned 2 GHz Mobile Satellite Service Frequencies,* Public Notice, FCC 05-134, IB Docket No. 05-221, at 1 (June 29, 2005) ("*Second 2 GHz MSS Public Notice*").

[4] *Second 2 GHz MSS Public Notice* at 1-2.

[5] *Id.* at 2.

[6] Comments of CTIA, IB Docket No. 05-220, at 2 (July 13, 2005); Comments of T-Mobile, IB Docket No. 05-220, at 9 (July 13, 2005).

MSS operators,[7] and Sirius Satellite Radio ("Sirius") urges the Commission to review all of the possibilities identified in the *Second 2 GHz MSS Public Notice* before expanding the spectrum assignments of ICO and TMI.[8]

These comments demonstrate that the issues raised by the Commission's two public notices are highly interrelated; accordingly, Intel agrees with Sirius that it does not make sense to bifurcate these issues into two separate proceedings. The Commission's decision with respect to the 11 MHz of 2 GHz spectrum identified in the *First 2 GHz MSS Public Notice* would directly affect its ability to maximize spectrum efficiency and consumer welfare in the remaining 13 MHz in this band. Thus, Intel recommends that the Commission develop one integrated record that includes all relevant spectrum management considerations for the full 24 MHz of unassigned 2 GHz band spectrum.

II. THE COMMISSION SHOULD APPLY MARKET-BASED PRINCIPLES TO PROMOTE THE HIGHEST AND BEST USE OF THE 2 GHz BAND AND MAXIMIZE CONSUMER WELFARE

The recent developments in the 2 GHz band raise substantial allocation, allotment, and assignment issues. Determining the highest and best use of this spectrum, the most efficient band plan, and the most capable licensees is a formidable task. Intel believes that the Commission should be guided by market-based spectrum management principles in this effort, as such an approach promotes the highest and best use of spectrum and maximizes consumer welfare. Moreover, a market-based approach would be consistent with recent Congressional and FCC policy, which has embraced such a

[7] Comments of Inmarsat, IB Docket No. 05-220, at 29 (July 13, 2005).

[8] Comments of Sirius, IB Docket No. 05-220, at 3-4 (July 13, 2005).

spectrum management model in place of the outdated "command and control" regulatory framework.[9]

In applying market-based principles to the 24 MHz of unassigned spectrum at 2 GHz, the Commission's "first best" solution would be to allocate these frequencies to flexible use licenses that could be used for any service permitted under the U.S. Table of Frequency Allocations.[10] Ideally, the Commission would employ a combinatorial bidding mechanism that would enable market forces to determine the use, the appropriate band plan, the geographic area covered by each license, and the specific licensees for this spectrum. Under such flexible-use licenses, the winning bidders could provide fixed or mobile terrestrial wireless services, MSS, or other satellite services. Having the ability to choose among a variety of technologies and services would enable the 2 GHz licensees to respond to evolving market demands, increase technological innovation, maximize spectrum efficiency, and enhance consumer welfare.[11]

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[9] In 1999, Congress gave the Commission authority under Section 303(y) of the Communications Act to establish flexible-use spectrum allocations, as long such flexible use would be consistent with international agreements, would not deter investment, and would not result in harmful interference. 47 U.S.C. § 303(y). *See also* Telecommunications Act of 1996, Pub. L. No. 104-04, Purpose Statement, 110 Stat. 56, 56 (1996) (purpose of the 1996 Act is to "promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies"); *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands,* Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 14165, ¶ 1 (2004) (adopting fundamental restructuring of 2.5 GHz licensing scheme to "greatly enhance[] flexibility in order to encourage the highest and best use of spectrum domestically and internationally, and the growth and rapid development of innovative and efficient communications technologies and services"); *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets,* Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 24817, ¶ 2 (2003) (adopting flexible spectrum leasing rules that "continue our evolution toward greater reliance on the marketplace to expand the scope of available wireless services and devices, leading to more efficient and dynamic use of the important spectrum resource to the ultimate benefit of consumers throughout the country").

[10] 47 C.F.R. § 2.106.

[11] *See* Spectrum Policy Task Force Report, ET Docket No. 02-135, at 16 (Nov. 2002) ("Flexibility enables spectrum users to make fundamental choices about how they will use spectrum (including whether to use it or transfer their usage rights to others) taking into account market factors such as consumer demand, availability of technology, and competition. . . . [T]his approach tends to lead to efficient and highly-valued

Unfortunately, it appears that the Commission may not have legal authority to implement such an ideal, flexible-use licensing scheme. Under the Orbit Act, enacted by Congress in 2000, the Commission lacks authority "to assign by competitive bidding orbital locations or spectrum used for the provision of international or global satellite communications services."[12] Because licensees obtaining the flexible-use licenses described above would be permitted to provide MSS and other international satellite services, the Commission may be precluded from assigning such licenses at auction. Former Chairman Michael Powell and the Spectrum Policy Task Force recommended that Congress repeal this legislative prohibition against competitive bidding and thus enable market-based spectrum management initiatives.[13] In that case, the Commission would have clear authority to employ the "first best" solution: adopt flexible-use allocations that permit both satellite and terrestrial operations and auction the spectrum to the highest bidder.

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spectrum uses."); Gregory L. Rosston & Jeffrey S. Steinberg, *Using Market-Based Spectrum Policy to Promote the Public Interest*, 50 FED. COMM. L.J. 87, 102 (1997) ("Flexibility eliminates artificial market entry barriers by enabling spectrum users to respond quickly to changing public demands for new and different services, as well as enabling users to introduce innovative services and technologies rapidly without administrative costs or delays."); Douglas W. Webbink, *Frequency Spectrum Deregulation Alternatives*, FCC Office of Plans and Policy Working Paper No. 2, at 28 (1980) ("If many [spectrum] restrictions were repealed, users could engage in other innovative kinds of communications, could use the spectrum more efficiently, and could earn additional revenues or profits.").

[12] Open-Market Reorganization for the Betterment of International Telecommunications Act, Pub. L. No. 106-180, 114 Stat. 48 § 647 (enacted Mar. 12, 2000), codified at 47 U.S.C. § 765f ("Orbit Act").

[13] *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems*; Third Report and Order, Third Notice of Proposed Rulemaking, and Second Memorandum Opinion and Order, 18 FCC Rcd 2223, 2283 (2003) (Separate Statement of Chairman Michael K. Powell); Spectrum Policy Task Force Report, ET Docket No. 02-135, at 42 (Nov. 2002).

III. THE COMMISSION SHOULD CONSIDER SEVERAL KEY FACTORS AS IT DEVELOPS THE "SECOND BEST" SOLUTION FOR REDISTRIBUTING THE UNASSIGNED 2 GHz SPECTRUM

While the Commission may be precluded from adopting the ideal allocation and assignment framework for the returned 2 GHz spectrum, it should develop a "second best" spectrum policy that is consistent with market-based principles. In doing so, the Commission should give close consideration to a number of key market factors, including the greater benefits of a larger bandwidth allocation and the higher market value associated with a terrestrial allocation.

A. Allocating 24 MHz for Terrestrial Use Would Provide Greater Benefits Than Allocating 13 MHz for Terrestrial Use

In considering how best to allocate the 24 MHz of returned 2 GHz spectrum, the Commission should consider the efficiencies that would result from the allocation of a larger bandwidth for terrestrial use. As set forth in detail in Appendix A, allocating the full 24 MHz of returned spectrum for terrestrial services would likely provide substantial cost savings to the licensee compared to a 13 MHz terrestrial allocation, making the larger allocation much more economically attractive and more efficient than the smaller allocation.[14]

A 24 MHz allocation would result in substantial cost savings and increase the economic attractiveness due to the significant incremental capacity the larger allocation affords and its impact on the capital expenditures a wireless carrier would need to spend to support increases in traffic. A wireless carrier would initially need to deploy the same number of cell sites to provide signal coverage under either a 13 MHz or 24 MHz allocation. As traffic on the network increases due to subscriber growth, expanded usage,

[14] *See* Appendix A.

or some combination thereof, a wireless carrier would need to deploy additional facilities to accommodate this increase. A 24 MHz allocation, however, would allow the carrier to deploy substantially less additional infrastructure as data traffic increases (as compared to a 13 MHz allocation). Indeed, the larger allocation would allow the carrier first to deploy additional channels in its network to meet such traffic increases, and only when the deployment of these additional channels is no longer sufficient to meet yet further increases in data traffic would the carrier need to construct more cell sites.[15] (Deploying additional channels requires significantly less capital than installing more cell sites. Cell sites can cost hundreds of thousands of dollars per site and represent a task of considerably greater complexity from an engineering standpoint.)

In comparison, a carrier operating under a 13 MHz allocation would need to add cell sites far sooner and at a much faster rate than a carrier operating under a 24 MHz allocation. For this reason, the greater bandwidth capacity provided by a 24 MHz allocation would require a wireless carrier to deploy only *one-third as many additional cell sites* as would be required on a 13 MHz allocation to accommodate the same increase in network traffic.[16]

This significant difference in infrastructure requirements, and thus capital expenditures, may very well affect a carrier's decision to invest in and deploy services in the 2 GHz band. The greater capital costs in deploying services over a 13 MHz allocation would lower the carrier's expected return, possibly to the point where the

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[15] By adding new sites, a carrier splits its coverage area into a greater number of cells, thus increasing the capacity of its system through frequency reuse. *See* Newton's Telecom Dictionary, at 363 (16th ed. 2000) (defining "frequency reuse" as the "ability to use the same frequencies repeatedly within a single system").

[16] Appendix A at A-1, A-4. Appendix A describes the reasonable set of assumptions used in calculating this estimate.

carrier would not earn a return even equal to its cost of capital and therefore be dissuaded from making the investment. In contrast, the greater efficiencies from a 24 MHz allocation would likely encourage investment, as it would make the expected return more commensurate with the level of risk in deploying new terrestrial services. Specifically, as explained in Appendix A, a carrier's projected return on investment falls from approximately 24 percent for a terrestrial system with a 24 MHz allocation to approximately 14 percent for a terrestrial system with a 13 MHz allocation.[17]

The advantages of a larger allocation also can be seen by comparing the net present value ("NPV") of the 10-year projected cash flows from a terrestrial wireless service on a 13 MHz allocation versus a 24 MHz allocation. For example, the NPV of a terrestrial wireless service deployed in the Washington, DC area for the 13 MHz allocation would be -$4 million (*negative* $4 million) over a ten-year period, while the NPV for the 24 MHz allocation would be +$36 million (*positive* $36 million).[18] On a MHz per Pop ("MHz-Pop") basis, these NPVs translate into an estimated valuation of -$0.063 per MHz-Pop for a 13 MHz terrestrial allocation and +$0.29 per MHz-Pop for a 24 MHz allocation.[19] These valuations demonstrate the relative differences between the two allocation scenarios. Thus, there is strong evidence that the market value, on a per MHz-Pop basis, of a 24 MHz terrestrial allocation is significantly more valuable than that for a 13 MHz allocation.

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[17] Appendix A at A-5.

[18] *Id.* at A-6.

[19] *Id.* As described in Appendix A, these valuations are derived from reasonable assumptions regarding the NPV of future cash flows in operating a terrestrial wireless system under the two allocation scenarios.

B. Available Evidence Indicates That a Terrestrial Allocation Would Maximize the Efficient Use of the Returned 2 GHz Spectrum

Available quantitative and qualitative data indicate that the marketplace would place a much higher value on the unassigned 2 GHz band spectrum under a terrestrial wireless allocation than under the existing MSS allocation. Drawing on estimates from the Commission and expert analysts, an auction of terrestrial-only licenses for this 2 GHz spectrum would likely yield over $9 billion dollars for the United States Treasury – a result that contrasts starkly with the recent voluntary return of three MSS licenses in the band. As described below, this higher market valuation for terrestrial wireless spectrum is a product of terrestrial operators' more efficient use of their licensed spectrum – an efficiency that promotes consumer welfare.

Over the last year, there have been several valuations of terrestrial wireless spectrum in the 1.9 GHz band. In July 2004, the Commission assigned a nationwide license at 1910-1915/1990-1995 MHz to Nextel Communications, Inc. as part of a spectrum realignment designed to resolve interference to public safety communications.[20] The Commission estimated the value of this spectrum based on prices paid by assignees in recent secondary market transactions involving broadband PCS licenses.[21] The Commission's final valuation for the 1.9 GHz spectrum was $1.70 per MHz-Pop – a total value of approximately $4.86 billion for the 10 MHz of spectrum at 1910-1915/1990-1995 MHz.[22] Since this valuation, two private analysts have come to similar

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[20] *Improving Public Safety Communications in the 800 MHz Band, Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels,* Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969 (2004) ("*800 MHz Order*").

[21] *Id.* at ¶¶ 293-297.

[22] *800 MHz Order* at ¶ 297.

conclusions regarding the value of the 1.9 GHz spectrum.[23]

If the Commission reallocates 24 MHz of unassigned spectrum to terrestrial wireless use, it is reasonable to conclude that this spectrum would hold a value similar to the nearby 1.9 GHz frequencies. Even if the value of the returned 2 GHz spectrum was discounted to account for possible increases in spectrum supply, the valuation would still be $1.29 per MHz-Pop.[24] At that value, an auction of the returned 2 GHz spectrum would yield approximately $9 billion![25]

The market value of MSS licenses at 2 GHz is certainly far below the likely value of terrestrial wireless licenses in this band. While Intel is not aware of any recent MSS transactions that could yield a precise MSS spectrum valuation, the fundamental reality is that the MSS industry has yet to even establish commercial viability. In early 2003, the Commission ruled that four of the eight MSS licensees in the 2 GHz band had failed to meet their first-year construction milestones and revoked those licensees'

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[23] As a starting point for two separate studies on the value of spectrum in the 700 MHz band, analysts with the Brattle Group and the Analysis Group each valued spectrum in the 1.9 GHz band. Weighing both the Commission's 2004 estimate for the 1.9 GHz spectrum and more recent transactions, the Brattle Group estimated spectrum in the 1.9 GHz band to have a value of $1.65 per MHz-Pop. Letter from William P. Zarakas and Dorothy Robyn, The Brattle Group, to the Honorable Joe Barton, Chairman, Committee on Energy and Commerce, U.S. House of Representatives, at 5-7 (May 18, 2005). Shortly thereafter, in a study commissioned by Intel, the Analysis Group decreased this estimate to $1.37 per MHz-Pop to account for changes in spectrum supply. Analysis of an Accelerated Digital Television Transition, Coleman Bazelon, Vice President, Analysis Group, at 5-8 (May 27, 2005) ("Analysis Group Report").

[24] According to the Analysis Group, the price impact of an increase in spectrum supply can be estimated by applying the concept of elasticity, which measures the ratio of the percentage change in quantity to a given change in price. The Analysis Group estimated the elasticity of demand for spectrum to be -1.2. Assuming this level of elasticity and the Analysis Group's "expected base of liberally licensed private spectrum" of 390 MHz, the Analysis Group estimated that the effect of the additional 78 MHz of commercial spectrum at issue in the DTV transition would decrease the $1.65 per MHz-Pop price to $1.37 per MHz-Pop. Analysis Group Report at 7-8. Adjusting this analysis to reflect the reallocation of an additional 24 MHz to terrestrial use would increase spectrum supply by approximately 6 percent and reduce the market valuation of any newly available spectrum by 5 percent (*i.e.*, $1.65 – (.17+.5)($1.65) = $1.29).

[25] With approximately 290 million pops in the U.S., an auction of the 2 GHz spectrum could therefore generate an estimated $9 billion (290 million pops x 24 MHz x $1.29 per MHz-pop).

authorizations.[26] Soon after, the Commission reallocated 30 MHz of the 2 GHz MSS allocation to terrestrial fixed and mobile services, reducing that allocation to its current size at 2000-2020/2180-2200 MHz.[27] In the decision, the Commission noted that "terrestrial wireless services have seen substantially higher subscribership growth than MSS, even though both services share nearly the same amount of spectrum."[28] Most recently, Boeing, Celsat, and Iridium voluntarily surrendered their 2 GHz MSS authorizations – action that led to the Commission's release of the 2 GHz public notices in July.[29]

C. The Remaining MSS Licensees Would Not Have Significant Market Power

The Commission should also bear in mind that, if it maintains just two MSS licensees in the 2 GHz band (*i.e.*, ICO and TMI), those licensees would not enjoy market power in the provision of either mobile voice services or broadband services. Indeed, there are additional MSS allocations in the L-band at 1.5/1.6 GHz and in the Big LEO

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[26] *See, e.g., Application of Globalstar, L.P.; For Modification of License for a Mobile-Satellite Service System in the 2 GHz Band; For Waiver and Modification of Implementation Milestones for 2 GHz MSS System*, Memorandum Opinion and Order, 18 FCC Rcd 1249 (2003) (declaring Globalstar's 2 GHz MSS authorization null and void due to failure to meet construction milestones); *TMI Communications and Company, Limited Partnership; Request for Modification of Spectrum Reservation for a Mobile-Satellite Service in the 2 GHz Bands; TMI Communications and Company, Limited Partnership, Assignor And TerreStar Networks Inc. Assignee; Request to Assign Spectrum Reservation,* Memorandum Opinion and Order, 18 FCC Rcd 1725 (2003)) (declaring TMI's 2 GHz MSS authorization null and void due to failure to meet construction milestones). The 2 GHz MSS license held by TMI was reinstated in June 2004. *See TMI Communications and Company, Limited Partnership and TerreStar Networks Inc., Application for Review and Request for Stay; TMI Communications and Company, Limited Partnership, Application for Modification of 2 GHz LOI Authorization; TMI Communications and Company, Limited Partnership, and Terrestar Networks, Inc., Request to Assign Spectrum Reservation*, Memorandum Opinion and Order, 19 FCC Rcd 12603 (2004).

[27] *MSS Reallocation Order* at ¶ 28.

[28] *Id.* at ¶ 30.

[29] Letter from Peter D. Shields, Counsel to Iridium, to Secretary, FCC (Mar. 16, 2005); Letter from Joseph P. Markoski and Bruce A. Olcott, Counsel for The Boeing Company, to Secretary, FCC (Mar. 28, 2005); Letter from David D. Otten, Chairman and Chief Executive Officer, Celsat, to Secretary, FCC (Apr. 12, 2005).

MSS band at 1.6/2.4 GHz, and such licensees as MSV, Inmarsat, Iridium, and Globalstar are all providing MSS to customers in the United States. Moreover, if ICO and TMI are able to build out their systems, they would face vibrant terrestrial wireless competition. As described in the Commission's most recent report on CMRS competition, 97 percent of the total U.S. population resides in counties with three or more different mobile telephone service providers, while 30 percent of the population (84 million people) lives in counties served by seven such providers.[30]

Over the next several years, terrestrial wireless competition will continue to increase as more robust wireless data services are rolled out first in the already-operational Specialized Mobile Radio, cellular, and broadband PCS bands, then in the Advanced Wireless Services ("AWS") bands at 1.7/2.1 GHz, and ultimately in the 700 MHz band. In particular, wireless broadband providers at 700 MHz will likely compete with satellite providers in rural areas, given the superior propagation characteristics of the 700 MHz band. Finally, MSS and satellite broadband providers will likely compete with terrestrial wireline substitutes, including cable modem and DSL services.

IV. THE COMMISSION SHOULD ALLOCATE THE FULL 24 MHz OF RETURNED 2 GHz SPECTRUM TO FIXED AND MOBILE TERRESTRIAL WIRELESS OPERATIONS AND DESIGNATE THE SPECTRUM FOR ADVANCED WIRELESS SERVICES

Taking into account the key market factors described above, Intel urges the Commission to allocate the full 24 MHz of returned 2 GHz spectrum to fixed and mobile terrestrial wireless services. Specifically, the Commission should designate this spectrum

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[30] *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, Ninth Report, 19 FCC Rcd 20597, ¶ 49 (2004).

for AWS and adopt a flexible licensing scheme that would result in efficient spectrum and geographic area combinations. Market-based spectrum valuations demonstrate that allocating all 24 MHz for terrestrial use would more effectively promote consumer welfare and efficient use of this spectrum (relative to assigning more spectrum to MSS licensees). Moreover, terrestrial wireless carriers would be able to achieve greater efficiencies if, as described above, the terrestrial allocation encompasses 24 MHz rather than just 13.3 MHz. In addition, assigning any of the 24 MHz of spectrum to MSS licensees is not necessary to promote competition, given that existing wireless, satellite, and wireline service providers would prevent the two remaining MSS licensees from exercising market power.

V. CONCLUSION

For the reasons set forth above, Intel urges the Commission to maintain its commitment to market-based spectrum management principles and adopt policies in the 2 GHz band that promote the highest and best use of this spectrum and maximize consumer welfare.

Respectfully submitted,

By: /s/ Peter Pitsch

Peter Pitsch
Communications Policy Director
Intel Government Affairs

Marjorie J. Dickman
Senior Attorney
Intel Government Affairs

Andrew Tang
Director, Wireless Systems Analysis
Broadband Wireless Division

Intel Corporation
1634 I Street, NW, Suite 300
Washington, DC 20006

July 25, 2005

APPENDIX A

Allocation of 13.3 MHz Versus 24 MHz for Terrestrial Use at 2 GHz: An Economic Comparison

Allocating all 24 MHz of the returned 2 GHz Mobile Satellite Service ("MSS") spectrum for terrestrial wireless services would result in greater economic benefits than allocating 13.3 MHz ("13 MHz") of this spectrum for terrestrial services. The following analysis compares the capital requirements and expected financial returns for the two allocation scenarios, based on reasonable assumptions regarding subscriber and traffic growth, anticipated subscriber revenues, build-out costs, and the cost of capital.

A 24 MHz allocation permits a terrestrial carrier to transmit approximately twice the amount of data compared to a carrier operating with a 13 MHz allocation. This greater capacity, however, translates into substantially greater cost savings as the carrier deploys additional infrastructure to meet growing consumer demand for its terrestrial services. Based on a conservative set of assumptions, the analysis below shows that the difference in capacity requires a carrier using a 13 MHz allocation to deploy *three times* the number of cell sites as a carrier using a 24 MHz allocation, with a corresponding difference in capital expenditures between the two different allocations.

The capacity and capital cost advantages associated with a 24 MHz allocation compared to a 13 MHz allocation may be critical in a wireless carrier's decision to invest in spectrum rights. As the analysis shows, the greater capital cost burden associated with the 13 MHz allocation may cause the carrier's projected costs to exceed its projected return, thus deterring it from participating in an auction of this spectrum. In contrast, again using conservative assumptions, the 24 MHz allocation would yield a rate of return that is commensurate with the investment risk. The net present value ("NPV") of a ten-year investment in a terrestrial network covering Washington DC deployed over a 24 MHz allocation is estimated to be $36 million compared to an NPV of -$4 million for an investment in a 13 MHz allocation. This translates to a NPV/MHz/pop of $0.29 for the 24 MHz allocation and -$0.063 for the 13 MHz allocation, indicating the disproportionately higher value associated with a 24 MHz allocation.

Assumptions

The following assumptions are used in this comparative analysis.

- The returned 2.0 GHz band spectrum is licensed in paired bands: 2 x 6.65 MHz for a 13 MHz allocation and 2 x 12 MHz for a 24 MHz allocation.

- WiMAX broadband data network deployed.

    - The 13 MHz allocation would accommodate 2 channels, each with 5MHz bandwidth.

    - The 24 MHz allocation would accommodate 4 channels, each with 5 MHz bandwidth, or, alternatively, 2 channels, each with 10 MHz of bandwidth.

- Revenue and subscriber projections are constant across both allocation scenarios.

- The system is deployed in Washington, D.C., a large U.S. market with attractive population densities and terrain "type B" (relatively flat with high foliage).

- Subscriber penetration reaches 12.5% of the households covered by year 10.

- Average revenue per unit ("ARPU") starts at $49.95/month decreasing to $45.00/month and then held constant at $45.00 under the assumption that new services are identified, provisioned and offered to counterbalance the pressure of declining ARPUs. Capital expenditures ("CapEx") reflect a level of continued investment to support this continuing level of ARPU.

- Traffic over the network assumes a peak data rate of 1megabits per second ("mbps") and an initial average data rate of 34 kilobits per second ("kbps") growing on a linear to 50 by year 10.

Impact on CapEx

A wireless carrier's CapEx in deploying cell sites will vary according to the spectrum allocation and user traffic patterns.

- *Initial Coverage Deployment.* For both the 13 MHz and 24 MHz allocations, initial coverage deployment requires approximately 343 cell sites to cover 80% of the population. The typical coverage deployment will only activate one channel.
  - For example, a carrier with a 13 MHz Allocation will deploy one 5MHz channel.
  - A carrier with a 24 MHz allocation will deploy one 10 MHz channel.
  - This difference in channel size results in a linear difference in capacity with the 24 MHz allocation (using a 10MHz channel) able to deliver 2x the data as the 13 MHz allocation (using a 5MHz channel).
- *Increases in Subscriber Traffic.* Over time, increases in subscriber traffic place corresponding greater demands on network capacity. To meet this demand for increased capacity, terrestrial carriers will typically first deploy additional channels, then split cells to make more intensive use of the spectrum they have within a given area.
  - *13 MHz Allocation.* A carrier operating on a 13 MHz allocation will confront capacity constraints from increased subscriber traffic sooner than a carrier with a 24 MHz allocation. When total data per base station exceeds approximately 15 mbps, the carrier with a 13 MHz allocation will need to add a channel. The incremental cost to add a channel is assumed to be approximately $30k. When the total data per base station exceeds 30 mbps, the carrier will need to add a new cell at a total cost of approximately $250k on average.
  - *24 MHz Allocation.* A carrier operating with a 24 MHz allocation will have a total capacity of 30 Mbps per each one-channel base station and a total capacity of 60 Mbps per each two-channel base station. Only when subscriber traffic exceeds 60 Mbps will the carrier need to split cells. The carrier operating with a 24 MHz allocation will not only need to start cell splitting at a later date, it will also engage in cell splitting at a slower rate as subscriber traffic continues to growth. The carrier with a 24 MHz allocation will only need to cell split once for every two times the carrier with a 13 MHz allocation needs to cell split.

- *Twice the Capacity, But Three Times Fewer Cell Sites.* As a result of the capacity difference between the 13 MHz and 24 MHz spectrum allocations, the carrier operating with a 13 MHz allocation will need to deploy an additional 533 cell sites (beyond the initial 343 cell cites) versus an additional 167 cell sites if it were operating with a 24 MHz allocation.

- *Substantially Lower CapEx.* The capacity difference means that a carrier operating with a 13 MHz allocation will face a CapEx that is **three times greater** than the CapEx of a carrier using a 24 MHz allocation for capacity build-out.

  - CapEx for initial coverage deployment = $95mm

  - CapEx for Increased Capacity (13 MHz allocation) = $129mm

  - Cap Ex for Increased Capacity (24 MHz allocation) = $41mm

Financial Return

In deciding whether to acquire spectrum rights, a wireless carrier will assess whether its projected return on such an investment exceeds the cost of the investment. If it does not, the carrier would not be expected to acquire the spectrum rights. It would not make economic sense to deploy a project that does not produce a return that at least equals the cost of deploying.

- *Weighted Average Cost of Capital.* The carrier's cost of capital is characterized as its weighted average cost of capital ("WACC"). The WACC is the weighted average of the expected returns available in the marketplace on comparable investments. WACC = (%debt in capital structure * cost of debt capital) + (% of equity in capital structure * cost of equity capital) An established company with a strong credit rating may have a WACC of 10-12%. Less established companies may have WACCs in the 15-20% range. WACC can also be viewed as the expectation for the company's overall return to investors (both debt and equity). In this sense the WACC can also be referred to as the "hurdle rate": the level that must be exceeded in order for the project to have a positive return and therefore make economic sense to pursue. When evaluating opportunities, private equity investors may typically have a hurdle rate in the15-25%, while venture capital firms will generally have a hurdle rate well above 20%. As a general rule, the riskier the project, the higher the WACC.

- *Internal Rate of Return.* The carrier's projected return on an investment is characterized as its Internal Rate of Return ("IRR"). The Internal Rate of Return is the imputed discount rate earned on the free cash flows that are related to deploying the network. Free cash flows is an estimate of the cash required/generated to operate the network. It includes capital costs, operating costs and revenue.

- *IRR – WACC Comparison.* The carrier will compare its WACC with the IRR in determining whether to make the investment.

  - *Comparison for 13 MHz Allocation.* The IRR for deploying a terrestrial wireless system with a 13 MHz allocation would be 13.9% based on the assumptions described above. Such an IRR may not exceed the hurdle rate, especially for less established companies or private equity or venture capital investors.

  - *Comparison for 24 MHz Allocation.* The IRR for deploying a terrestrial system with a 24 MHz allocation would be 23.6% based on the above assumptions. Such an IRR is commensurate with the risk of project deployment as reflected in the WACC.

- *CapEx Differences.* The significantly higher IRR for the 24 MHz allocation is a function of the disproportionately lower CapEx for such an allocation, which in turn is the result of the capacity advantages of such a larger allocation. These advantages may be critical in the carrier's decision regarding whether to invest in the spectrum rights.

– *Net Present Value.* A carrier's decision to invest in spectrum rights can also be analyzed by examining the net present value ("NPV") of the projected future cash flows of the proposed deployment. The NPV is calculated by discounting the future cash flows back to the present using a discount rate equal to the WACC. A positive NPV indicates that the network operator receives more cash than he is required to invest, resulting in the project contributing positively to overall value. On the other hand, a negative NPV indicates that the investment is greater than the returns, resulting in a project that diminishes overall value.

- *NPV for 13 MHz Allocation.* As can be seen in the attached chart, deploying a terrestrial system over a 13 MHz allocation does not realize a positive NPV over the entire 10 year projection horizon: the 10-year NPV is –$4.4 million.

- *NPV for 24 MHz Allocation.* Deploying a terrestrial system over a 24 MHz allocation results in break-even NPV by year 8 and a NPV through year 10 of $36.2 million.

- *Market Value of Spectrum.* The NPV can be used to estimate the market value of the spectrum on a "per MHz per pop" basis using the assumptions described above. For the 24 MHz allocation, the NPV/MHz/pops is $0.29/MHz/pop ($36.2 million / 24 MHz / 5.0 million). For the 24 MHz allocation, the NPV/MHz/pops is -$0.063/MHz/pop (-$4.4 million / 13 MHz/5.0 million).